



**CUSTOMER FEEDBACK TEAM**

**USER EVALUATION OF FACTORY TREATED PERMETHRIN FIELD UNIFORM**

**1st Battalion, 509th Infantry (Airborne)  
Fort Polk, LA**

**8 May 2000**

**Charles Greene**

**U.S. Army Soldier and Biological Chemical Command  
Natick, MA 01760**

## EXECUTIVE SUMMARY

**Background:** The U.S. Army Soldier Biological and Chemical Command conducted an evaluation of Permethrin factory-treated field uniforms at Fort Polk, Louisiana. A pilot evaluation of a treated Woodland Camouflage HWBDU was conducted with 89 Operational Controllers from JRTC from May to August. After the pilot evaluation was completed, more than 350 soldiers from the 1st Battalion, 509th Infantry (Airborne) were issued treated OG-107 Jungle Fatigues for the primary evaluation which started in August 1999. Midpoint data was collected for this group in November 1999 and final data was collected in March 2000.

**Item Description:** Both the Woodland Camouflage HWBDU and the OG-107 Jungle Fatigues worn by the participating units were factory impregnated with 0.125 milligrams of Permethrin per square centimeter. All uniforms were constructed from a 50/50 nylon and cotton ripstop fabric, which is standard for a hot weather uniform.

**Survey Sample:** The average age of the evaluation participants was 25. The most common Military Occupation Specialty (MOS) was Infantry, accounting for about three-fourths of the respondents. More than two-thirds of the respondents were from the ranks E-1 to E-5.

**Wear Time:** By the time the final questionnaire was administered in March 2000 soldiers reported that they had worn the treated uniforms an average total of 55 days for an average of 20 hours per day.

## KEY FINDINGS

Presented below are the key findings paired against the six evaluation factors outlined in the evaluation plan.

1. Does the Permethrin-treated uniform offer equivalent or superior insect protection over what is currently used by soldiers in the field?

**Yes.** Ninety percent of the soldiers felt that they had fewer bites than usual when wearing the treated uniform. Also, when satisfaction ratings for the treated uniforms were compared with satisfaction ratings for various insect repellents, the treated uniform received significantly higher ratings for effectiveness against crawling insects, flying insects, ticks, and chiggers.

2. Does the Permethrin treatment have any impact, either positive or negative, on the health or safety of the evaluation participants?

**No.** Ninety-four percent (94%) of the soldiers at the end of the evaluation felt that the treated uniform was safe to wear. While there were some reports of irritation that respondents attributed to the Permethrin treatment, this was only true for about one-fourth of the survey group. Most of these problems were minor (a sensation or low-level rash) and were transitory (about a week in duration). Laundering the uniform a few times seemed to eliminate the problem for half of those who experienced it, while others reported that it faded over time. Only five soldiers (3.8%) indicated that they experienced irritation whenever they put the uniform on.

3. What impact does laundering and exposure to field conditions (i.e. sun, rain, dirt, etc.) have on the effectiveness of the Permethrin treatment?

**Minimal.** The treated uniforms probably lost some of their effectiveness over time. Ratings for effectiveness against flying and crawling insects were significantly lower at the end of the evaluation than at the midpoint, but were not significantly different for effectiveness against ticks and chiggers. However, 90% of the soldiers felt that they were still receiving fewer bites when they wore the treated uniform at the end of the evaluation.

4. Does the Permethrin treatment have any impact on basic uniform performance (i.e. comfort, durability, etc.)?

**No.** The Permethrin treatment did not have a significant impact on basic uniform performance. However, the change of the OG-107 fabric from 100% cotton (non-standard) to a 50/50 nylon and cotton fabric (standard) probably did. Durability was similar, if not better than expected. Comfort was not impacted in a major way. Only about 20% (n=25 out of 131) felt that the treated uniform was less comfortable than an untreated uniform. Most of these (n=14 out of 25) reported that the treated uniform felt hotter. The 50/50 nylon and cotton fabric is somewhat less breathable than 100% cotton and may feel somewhat hotter. Only 5% (n=7 out of 132) felt that the treated uniform was less comfortable due to a rash or irritation.

5. What impact, either positive or negative, does the Permethrin treatment have on overall soldier performance and effectiveness in the field?

**Positive impact.** It appears that the factory applied Permethrin treatment probably did improve soldier performance to some extent. These soldiers felt that wearing the treated uniform led to fewer insect bites, controlled insects on and around them, and offered better protection than an untreated uniform with insect repellent. Furthermore, the factory treated uniform received significantly higher satisfaction ratings for suitability for field use and overall performance than the untreated uniform/insect repellent combination.

6. Do soldiers prefer the factory applied Permethrin treated uniform over present options for insect protection in the field?

**Yes.** Overall, 87% of the evaluation participants preferred the Permethrin treated uniform to present options for insect protection in the field, which for this group primarily consisted of the use of insect repellent. Furthermore, 87% of the respondents also felt that the Permethrin treated uniform should be offered in the Clothing Sales Store as an optional purchase item. Most of those who disagreed (n=18), were primarily concerned with increased uniform cost (n=13).

## **Table of Contents**

### **INTRODUCTION**

<b>Background</b>	<b>1</b>
<b>Item Description</b>	<b>2</b>
<b>Evaluation Procedures</b>	<b>2</b>
<b>Data Handling and Analysis</b>	<b>2</b>

### **FINDINGS**

<b>Survey Sample</b>	<b>3</b>
<b>Wear Time</b>	<b>4</b>
<b>Use of Insect Repellent</b>	<b>5</b>
<b>Laundering</b>	<b>5</b>
<b>Insect Protection</b>	<b>5</b>
<b>Comfort</b>	<b>6</b>
<b>Safety</b>	<b>7</b>
<b>Performance Ratings</b>	<b>8</b>
<b>Preference</b>	<b>10</b>

### **DISCUSSION**

<b>Attachment A: User Evaluation Plan for Factory-treated Permethrin Field Uniforms</b>	<b>15</b>
<b>Attachment B: Permethrin-treated Uniform Pilot Evaluation Summary</b>	<b>19</b>
<b>Attachment C: Permethrin Field Uniform Background Questionnaire</b>	<b>21</b>
<b>Attachment D: Permethrin-treated uniform Evaluation Background Questionnaire Summary</b>	<b>25</b>
<b>Attachment E: Permethrin-treated Field Uniform Midpoint Questionnaire</b>	<b>27</b>
<b>Attachment F: Permethrin Field Uniform Final Questionnaire</b>	<b>35</b>
<b>Attachment G: Permethrin-treated Uniform Midpoint Questionnaire Summary</b>	<b>41</b>
<b>Attachment H: Permethrin-treated Uniform Final Questionnaire Summary</b>	<b>47</b>

## INTRODUCTION

### *Background*

The U.S. Army Soldier and Biological Chemical Command conducted an evaluation of Permethrin factory-treated field uniforms at Fort Polk Louisiana between May 1999 and March 2000. Permethrin, an FDA approved insect repellent, has been used by the Army as a uniform treatment for some time. It has proven to be beneficial in the reduction of insect bites that can impact the effectiveness of military personnel in the field. However, present techniques require that the user perform procedures to apply the Permethrin treatment. This can be accomplished in two ways: either with an Individual Dynamic Absorption Kit, which requires soaking the uniform in a solution, or through use of an aerosol spray. In addition to being time-consuming, this process also introduces the possibility of human error that could lead to misapplication and direct exposure of the chemical in liquid form to the skin in an uncontrolled dosage rate. The goal of this evaluation was to provide data to be used by decision makers as to the suitability of factory applied Permethrin treatment. The treated uniform should provide the individual soldier with insect protection equivalent to, or greater than, presently fielded capabilities for a prolonged period with no adverse effects.

The evaluation was conducted utilizing soldiers from the 1st Battalion, 509th Infantry (Airborne) and with the Operational Controllers assigned to the Joint Readiness Training Center (JRTC). A copy of the evaluation plan is included as Attachment A. A total of 89 Operational Controllers were issued the treated Woodland Camouflage Hot Weather Battledress Uniform (HWBDU) in May 1999 and final data was collected from this group in August 1999. This was primarily a pilot evaluation conducted prior to issuing the bulk of the uniforms to the 509th. The feedback from these participants was used to focus the briefings for the primary evaluation group and to provide input into the questionnaires that they would be completing. A summary of these results is presented as Attachment B. A total of 349 soldiers from the 509th were issued their uniforms in August 1999. At this time the participants completed a background questionnaire - a copy of this questionnaire and a summary of the results are included at the end of this report (see Attachment C and Attachment D, respectively). Midpoint data was collected in November 1999 and final data was collected in March 2000. The questionnaires used at the midpoint and at the end of the evaluation are included as Attachments E and F, respectively. A summary of the results for the midpoint and final questionnaire are included as Attachments G and H, respectively.

### ***Item Description***

Both the HWBDU and the OG-107 Jungle Fatigues were factory impregnated with 0.125 milligrams of Permethrin per square centimeter. Both uniforms were constructed from a 50% nylon and 50% cotton ripstop fabric. It should be noted that up until this evaluation, the OG-107 has been constructed from a 100% cotton ripstop fabric. This fabric is no longer standard, and so the 50/50 nylon and cotton fabric was substituted. A total of 1,629 uniforms were treated.

### ***Evaluation Procedures***

All potential evaluation participants were briefed prior to being issued uniforms on the purpose of the evaluation. At that time, they also received a briefing on Permethrin and were advised by medical personnel from Fort Polk on the potential risks and procedures to follow if they noted any side effects. Participation was completely voluntary - the soldiers were informed numerous times that they did not have to take the uniforms and that, even if they did and had second thoughts, they did not have to wear them. Those who agreed to continue were then fitted and issued three sets of Permethrin-treated uniforms. For the primary evaluation group, data was collected ninety days after issue for the midpoint and ninety days after that for the final data collection.

### ***Data Handling and Analysis***

This was a straightforward user evaluation of the factory applied Permethrin treatment of the field uniform. No control group was used since there is really no "standard" form of insect protection: in most cases soldiers can use a mix of military and commercial options, or none at all. The primary data used to determine performance and acceptability of the treated uniforms was from the final questionnaire. This provides the best information on these characteristics because it captures the sum total of six months of experience with the treated uniforms.

There were some instances where the data collected were analyzed to examine changes over time and also comparison to prior methods of protection. For example, when dealing with the perceived effectiveness of the treatment over time, mid-point and final data can be compared to see if there was a significant decrease in soldier acceptability for this factor between the mid-point and the final data collection. In addition, responses from the final questionnaire can be compared to data collected from the background questionnaire to determine if the treated uniform performs significantly better than the method that was used before the evaluation began.

It was felt that over-analyzing this data would detract from the primary goal of the evaluation: to determine the suitability of factory treatment of field uniforms with Permethrin. Therefore, statistics used to analyze trends amongst the background, midpoint, and final data sets will be applied only when they can contribute to accomplishing this goal. In addition, a summary of the data from the background and midpoint questionnaires is included as Attachment F and G, respectively. The data will only be presented in the text of the report if it is relevant.

Only those respondents who reported that they wore the Permethrin treated field uniform at least once were retained for analysis of the final questionnaire data. This left a total of 132 respondents out of 134 questionnaires collected. Statistics used to describe the data are the number of responses (n) and the percentage of the total responding to a certain option in a "yes - no" or multiple choice question. The mean (X) is reported for scale-ended questions related to uniform acceptability.

Analyses were conducted to determine if certain conditions (i.e. length of wear, laundering, etc.) had an impact on the data. Depending on the number of groups involved, the t-test or the Analysis of Variance (ANOVA) was used to test for differences when scale-ended questions were involved, and the Chi-square test was used for dichotomous data. In all cases the .05 criterion level was used to determine significance. Significant differences will be discussed at the appropriate points in the report.

## **FINDINGS**

### ***Survey Sample***

Evaluation participants were from the 1st Battalion, 509th Infantry (Airborne), stationed at Fort Polk, Louisiana. The initial survey sample from the background questionnaire data collection, which included all evaluation participants, consisted of 356 soldiers. The midpoint and final questionnaire samples consisted of all available evaluation participants at the time of the three-month and six-month data collections: 141 and 132 respondents, respectively. The average age for all three samples was 25. The most common Military Occupation Specialty (MOS) was Infantry: accounting for three fourths of the initial group (75%), and slightly more for the two follow-ups (77% at the midpoint and 88% at the final). The breakdown by rank for all three samples is presented below in Table 1.

**Table 1**  
**Rank Breakdown**

<b><u>Rank Category</u></b>	<b><u>Background</u></b>	<b><u>Percent &amp; n</u></b> <b><u>Midpoint</u></b>	<b><u>Final</u></b>
E-1 to E-3	27% (n=94)	26% (n=37)	21% (n=28)
E-4 to E-5	47% (n=166)	54% (n=76)	59% (n=78)
E-6 to E-9	18% (n=64)	13% (n=18)	17% (n=22)
O-1 to O-5	8% (n=29)	7% (n=10)	3% (n=4)

As can be seen above, the sample by rank did not vary much over time: in all cases more than two-thirds of the respondents were from the ranks E-1 to E-5.

### ***Wear Time***

When the final questionnaire was administered soldiers reported that they had worn the treated uniforms an average total of 55 days. It was also estimated that they wore them an average of 20 hours per day. Wear was not distributed evenly across all three sets of uniforms: one uniform was worn more often ( $X=23$  days) than the others ( $X=16$  days and 13 days). Overall, wear estimates from the final data collection were approximately doubled from the midpoint estimates (total wear:  $X=23$  days).

Eleven percent (11%,  $n=15$  out of 132) of the group reported that one or more of the uniform components (i.e. coat or trousers) had been damaged by the time of the final questionnaire and could no longer be worn. This is only a slight increase from the 9% ( $N=12$  out of 141) who had experienced durability problems by the time of the midpoint questionnaire. Only half as many soldiers reported fit problems at the end of the evaluation than at the midpoint (4%,  $n=6$  out of 132 and 8%,  $n=11$  out of 141, respectively).

In some instances soldiers mixed and matched treated and untreated uniform components at the midpoint (14%,  $n=21$ ) and at the end of the evaluation (26%,  $n=32$ ). In both instances, soldiers estimated that they "sometimes" mixed components (2.0 on a four-point scale: 1="Almost Never," 2="Sometimes," 3="Often," and 4="Always"). In general, it would seem that soldiers followed the instructions they were given for the evaluation: wear the uniforms frequently, wear all three sets of uniforms, and try to avoid mixing treated and untreated components.



### ***Use of Insect Repellent***

During the briefing prior to uniform issue, soldiers were advised to treat exposed skin with insect repellent since the Permethrin treatment would obviously only protect those areas covered by the uniform. At the time of the final questionnaire about half of the survey group reported that they used insect repellent when they wore the treated uniforms (49%, n=64 out of 132). This was primarily on exposed skin (97%, n=66 out of 68) and is almost identical to the results from the midpoint data collection. There were some who applied it directly to the treated uniform (midpoint: 9%, n=6 out of 68) or to skin under the uniform (4%, n=3). The most popular repellent used was Deep Woods Off (71%, n=48 out of 68), Army issue (27%, n=18 out of 68), and Cutter (18%, n=5 out of 68). The most popular form of repellent was either spray (84%, n=57 out of 68) or liquid (28%, n=19 out of 68). These numbers are very similar to those reported on the midpoint questionnaire.

### ***Laundering***

Ninety-two percent (n=122 out of 132) reported on the final questionnaire that they had laundered at least one of the treated uniforms. Almost all of the respondents indicated that they performed this task themselves using a washing machine (96%, n=118 out of 122). These numbers were nearly identical to those reported on the midpoint survey. The average for all of the treated uniforms was 26 times: 10 for the set worn most frequently and nine and six times for the other two sets. This was a major increase over the number of launderings received at the midpoint (total: X=7).

There were a few cases where soldiers felt that the uniform became less effective after laundering, and this was somewhat more apparent on the final questionnaire (12%, n=14 out of 122) than on the midpoint (6%, n=8). The same number of soldiers on each survey (n=6) reported that the effectiveness dropped off initially and then stabilized. There was an increase in those who noted a continual drop off after each laundering (midpoint: n=2, final: n=8).

### ***Insect Protection***

More than half (53%, n=69) of the respondents to the final questionnaire reported that they received insect bites to exposed skin (i.e. an area not covered by the treated uniform) during the evaluation. The most common were mosquito bites (n=62), followed by chiggers (n=5), spider bites (n=4), ant bites (n=4), and ticks (n=2). Fourteen percent (n=18 out of 132) reported that they received an insect bite under an area covered by the treated uniform. These were listed as mosquito bites (n=10), chiggers (n=3), ant bites (n=2), and spider bites (n=2). There were no cases of anyone having to seek medical treatment for a bite that they received.

While many of the evaluation participants received some type of insect bite, particularly on exposed skin, most seemed to think that they would have been worse off if they had not been wearing the treated uniform. Ninety percent (n=115 out of 127) indicated on the final questionnaire that they felt they had received fewer insect bites than usual when they were wearing the treated uniform. In addition, 91% (n=118 out of 129) felt that the treated uniforms helped control insects on and around them. Finally, 91% (n=118 out of 129) felt that the Permethrin treated uniform offered a better level of protection than a combination of an untreated uniform and insect repellent. These numbers are highly similar to those received on the midpoint questionnaire.

Final questionnaire data related to protection were correlated with the number of times soldiers reported both wearing and laundering the uniform. No relationship was found suggesting that, despite any loss of effectiveness based on field use or laundering, soldiers still considered the uniform as contributing to fewer insect bites, and helping to control insects on and around them.

### *Comfort*

About one-fourth (24%, n=31 out of 131) of the respondents to the final questionnaire felt that the uniform treatment had an impact on uniform comfort. About one-half of this group (55%, n=17 out of 31) felt that the treated uniform was less comfortable to wear and about one-half (45%, n=14) felt that it was more comfortable to wear. While soldiers were not given the opportunity to comment on this question in the final questionnaire, they were given that opportunity on the midpoint, and it would seem that data collected at the midpoint can shed some light on this factor.

At the midpoint about one-fourth of the group felt that the treatment had an impact on comfort (26%, n=35 out of 136). However, there were more respondents who felt that it made the uniform less comfortable (71%, n=25 out of 35) rather than more comfortable (29%, n=10 out of 35). There were those who felt that the uniform was less comfortable due to a rash or skin irritation that they perceived was caused by the Permethrin treatment (n=7). However, the most common response was that the treated uniform felt "hotter" than an untreated uniform (n=14). This is almost certainly due to the change in the fabric for the OG-107s procured for the evaluation from 100% cotton to a 50/50 nylon and cotton fabric.

## *Safety*

Overall, almost all of the respondents to both the midpoint (92%, n=118 out of 129) and final questionnaire (94%, n=120 out of 127) felt that the factory treated Permethrin uniforms were safe to wear. These numbers are quite high and would seem to suggest that the respondents had confidence that the treated uniforms did not pose a threat to their personal safety. However, there were some issues related to perceived side effects that should be discussed. These first appeared at the midpoint data collection and the questionnaire used then was revised to provide further information for the final data collection.

Nearly a third of the respondents at the time of the midpoint (29%, n=39 out of 135) felt that the treated uniform had caused them some type of physical problem that they would not normally have. Most of these soldiers (n=37 out of 38) described the problem as "minor" as opposed to "major" (n=1). Their open-ended comments seemed to indicate that most had experienced some kind of rash or "burning sensation" (n=34). Comments on this issue from the midpoint questionnaires (see Attachment X) were examined, and a new series of questions related to this issue were developed for the final questionnaire.

Twenty percent (n=26 out of 132) of the final questionnaire respondents felt that the uniform caused some type of physical problem that they would not normally have. Soldiers used a checklist to help them describe the type of problem that they had (see Table 2).

**Table 2**  
**Final Questionnaire: Reported Skin Problems**  
**(n=26)**

<b><u>Problem</u></b>	<b><u>n</u></b>
Minor irritation (no redness but slight burning sensation, "tingling," etc.)	13
A rash (redness, itching, burning sensation, etc.)	15
Major skin problems (redness, itching, oozing, etc.)	2
The uniform aggravated another problem I had	0

Once again, the main problem was either a rash or some lesser irritation (i.e. a burning sensation or tingling). A follow-up question determined that the extent of the problem was limited to a specific area of the body (n=21 out of 26): the arms (n=8), crotch (n=7), neck (n=5), legs (n=4), underarms (n=2),

waistline (n=2), neck (n=1), chest (n=1), and back (n=1). There were also five soldiers who said that this was not the case, that they experienced a rash or irritation "all over." Four respondents claimed that they did seek medical attention for the problem, with only two offering any kind of explanation: they went on sick call and were prescribed an ointment.

About half of those who reported a problem on the final questionnaire indicated that this occurred at the beginning of the evaluation (n=12) and lasted an average of four days. A second group reported that the problem occurred during the evaluation and lasted an average of eight days (n=7). The remainder (n=5) reported that they experienced the problem whenever they wore the uniform. About half (n=13) also reported that laundering the uniforms eliminated the rash or irritation. They reported that it took an average of 3 launderings, with the minimum being one and the maximum being eight.

For the most part these problems seem minor. It should be remembered that these are not medical reports but "self diagnosis" based on the respondents experiences and beliefs. Half of the problems could not be detected visually (i.e. there was no redness) but were just sensations of "tingling" or "burning." It is also interesting to note that most problems were transitory, and went away after a few launderings or about a week of wear. It is possible that some individuals were sensitive to Permethrin: perhaps those who indicated that they had a rash "all over" (wherever the uniform touched) - (n=5) or that they developed a rash whenever they wore the uniform (n=5). However, only one soldier reported both of these situations ("all over" rash whenever they wore the uniform). It should also be noted that, in the field, a rash could be caused by a variety of sources other than (e.g. poison ivy, oak, or sumac). Some soldiers may have been exposed to these poisonous plants since they are prevalent at JRTC.

### ***Performance Ratings***

Soldiers rated how satisfied or dissatisfied they were with various uniform criteria both at the midpoint and at the end of the evaluation. It should be noted that the treated uniform received acceptable ratings for all of the criteria evaluated at both the three-month and six-month data collections. Ratings for field suitability and overall performance were highly acceptable throughout the evaluation. However, there were some differences in the ratings. The data was analyzed using a t-test and the results obtained are presented below in Table 3.

**Table 3**  
**Satisfaction Ratings: Midpoint vs. Final**

	VERY DISSATISFIED 1	MODERATELY DISSATISFIED 2	SOMEWHAT DISSATISFIED 3	NEITHER DISSATISFIED NOR SATISFIED 4	SOMEWHAT SATISFIED 5	MODERATELY SATISFIED 6	VERY SATISFIED 7
<u>Criteria</u>				<u>Midpoint (n=134)</u>	<u>Final (n=126)</u>	<u>t</u>	<u>p</u>
Length of protection				5.8	5.5	1.79	ns
Effectiveness against crawling insects				5.8	5.4	2.07	*
Effectiveness against flying insects				5.8	5.2	2.77	**
Effectiveness against ticks & chiggers				5.9	5.6	1.72	ns
Lack of physical side-effects (i.e. rash, irritation, etc.)				5.3	5.5	0.72	ns
Suitability for field use				6.0	5.8	0.69	ns
Overall performance				5.9	5.8	0.71	ns

ns = Not significant

\* = Significant difference,  $p < .05$

\*\* = Significant difference,  $p < .01$

There were no significant differences detected between the data collected at the midpoint and at the end of the evaluation for length of protection, effectiveness against ticks and chiggers, lack of physical side effects, suitability for field use, or overall performance. However, ratings for effectiveness against crawling and flying insects were significantly lower at the end of the evaluation than they were at the midpoint. While all ratings were still acceptable and positive, this may suggest that the effectiveness of the uniform treatment was starting to degrade over time.

The satisfaction ratings from the final questionnaire data were correlated with the number of times soldiers reported both wearing and laundering the uniform. No relationship was found. As noted in the previous section on insect protection, this suggests that, within the scope of this data, any loss of effectiveness did not seem to be solely related to laundering or wear.

**Table 3**  
**Satisfaction Ratings: Midpoint vs. Final**

	VERY DISSATISFIED 1	MODERATELY DISSATISFIED 2	SOMEWHAT DISSATISFIED 3	NEITHER DISSATISFIED NOR SATISFIED 4	SOMEWHAT SATISFIED 5	MODERATELY SATISFIED 6	VERY SATISFIED 7
<u>Criteria</u>				<u>Midpoint (n=134)</u>	<u>Final (n=126)</u>	<u>t</u>	<u>p</u>
Length of protection				5.8	5.5	1.79	ns
Effectiveness against crawling insects				5.8	5.4	2.07	*
Effectiveness against flying insects				5.8	5.2	2.77	**
Effectiveness against ticks & chiggers				5.9	5.6	1.72	ns
Lack of physical side-effects (i.e. rash, irritation, etc.)				5.3	5.5	0.72	ns
Suitability for field use				6.0	5.8	0.69	ns
Overall performance				5.9	5.8	0.71	ns

ns = Not significant

\* = Significant difference,  $p < .05$

\*\* = Significant difference,  $p < .01$

There were no significant differences detected between the data collected at the midpoint and at the end of the evaluation for length of protection, effectiveness against ticks and chiggers, lack of physical side effects, suitability for field use, or overall performance. However, ratings for effectiveness against crawling and flying insects were significantly lower at the end of the evaluation than they were at the midpoint. While all ratings were still acceptable and positive, this may suggest that the effectiveness of the uniform treatment was starting to degrade over time.

The satisfaction ratings from the final questionnaire data were correlated with the number of times soldiers reported both wearing and laundering the uniform. No relationship was found. As noted in the previous section on insect protection, this suggests that, within the scope of this data, any loss of effectiveness did not seem to be solely related to laundering or wear.

At the beginning of the evaluation, satisfaction ratings had been obtained on the same criteria for various types of insect repellent that soldiers reported they are using now. These included commercial items like Deep Woods Off, Cutter, and Repel, as well as the standard issue Army version. Statistical analysis showed that there were no significant differences between any of the insect repellents. Therefore, data pertaining to all of these were combined together and compared with the final questionnaire data on the Permethrin treated uniform. The results obtained, as well as those of a t-test, are presented below in Table 4.

**Table 4**  
**Mean Ratings: Insect Repellent vs. Permethrin Treatment**

	VERY DISSATISFIED 1	MODERATELY DISSATISFIED 2	SOMEWHAT DISSATISFIED 3	NEITHER DISSATISFIED NOR SATISFIED 4	SOMEWHAT SATISFIED 5	MODERATELY SATISFIED 6	VERY SATISFIED 7
				<b>Insect Repellent (n=272)</b>	<b>Permethrin Treatment (n=126)</b>	<b>t</b>	<b>p</b>
<b>Criteria</b>							
Length of protection				4.2	5.5	7.05	***
Effectiveness against crawling insects				3.9	5.4	7.99	***
Effectiveness against flying insects				4.6	5.2	3.15	**
Effectiveness against ticks & chiggers				4.2	5.6	7.36	***
Lack of physical side-effects (i.e. rash, irritation, etc.)				5.7	5.5	0.79	ns
Suitability for field use				5.1	5.8	3.98	***
Overall performance				4.8	5.8	6.00	***

ns = Not significant

\*\* = Significant difference,  $p < .01$

\*\*\* = Significant difference,  $p < .001$

The Permethrin treated uniform was rated significantly higher than insect repellent for all of the criteria evaluated except for lack of physical side effects. Some of these differences are quite dramatic. For example, the treated uniform received acceptable ratings for all effectiveness ratings, while insect repellent received only neutral ratings. Overall performance and suitability for field use were acceptable for insect repellent, scoring right around "Somewhat Satisfied," while ratings for the treated uniform were highly acceptable, falling just under "Moderately Satisfied." In general, this data would seem to suggest that soldiers are much more satisfied with using the Permethrin treated uniform than they are with any of the commercial or even the standard issue insect repellent.

## ***Preference***

Respondents to both the midpoint and final questionnaire were asked which they would prefer to wear in the field: a Permethrin treated uniform with or without insect repellent or an untreated uniform with or without insect repellent. The results obtained are presented below in Table 5.

**Table 5**  
**Preference Data: Treated vs. Untreated Uniforms**

	<b>Midpoint</b> <b><u>(n=133)</u></b>	<b>Final</b> <b><u>(n=128)</u></b>
The Permethrin-treated uniform with no insect repellent	39% (n=52)	38% (n=49)
The Permethrin-treated uniform with insect repellent	50% (n=67)	49% (n=63)
An untreated uniform with insect repellent	8% (n=10)	8% (n=10)
An untreated uniform with no insect repellent	3% (n=4)	5% (n=6)

Soldiers overwhelmingly preferred the treated uniform by a 6:1 margin on both the midpoint (89% to 11%) and final questionnaires (87% to 13%). However, the most popular option was a treated uniform used in conjunction with some type of insect repellent. Comments received on the final questionnaire explained that soldiers felt the treated uniform offered good protection against insects (n=12) and that it proved effective in the field (n=8). Others noted that, even with the treatment, they still needed insect repellent to protect their hands and face (n=19). Those who chose to wear a treated uniform alone noted that they did not like to use insect repellent (n=15). Some explained that insect repellents wear off fast (n=3), irritate their skin (n=3), or irritate their eyes (n=2).

Those who chose an untreated uniform commented that the treated uniform was too hot (n=4) or did not offer improved protection over insect repellent (n=2). There were also a few respondents who indicated that they did not want to use any chemicals, not even insect repellent (n=2) and some who said that they are not bothered by insects at all (n=2).

Finally, soldiers were asked if they felt the treated uniform should be offered for sale in the Military Clothing Sales Store. The majority responded affirmatively on both the midpoint (80%, n=104 out of 130) and the final questionnaire (87%, n=111 out of 127). Comments received on the final questionnaire in support of this option were that soldiers should be given the option of buying them (n=18) and that the uniform treatment works (n=13). There were also a number of soldiers who said that



they would purchase more sets if they were available (n=8). Those who were against this option were primarily concerned with cost (n=8) and some indicated that the uniforms should be a free issue (n=5). There were a few soldiers who wrote that they were not convinced the uniform was safe to wear (n=2) and that it was too hot (n=2).

## DISCUSSION

Any discussion of the data presented in this report should obviously use the framework of the evaluation factors. Therefore, the following paragraphs will examine how the results presented in this report match up with the factors listed in the evaluation plan (see Attachment C, section 7). These were: Does the treated uniform offer equivalent or superior insect protection over what is currently used by soldiers in the field?; Does the treatment have any perceived impact, either positive or negative, on the health or safety of the evaluation participants?; What impact does laundering and exposure to field conditions have on the effectiveness of the treated uniform?; Does the treatment have any impact on basic uniform performance (i.e. comfort, durability, etc.)?; What impact, either positive or negative, does the treatment have on overall soldier performance and effectiveness in the field?; Do soldiers prefer the treated uniform to present options for insect protection in the field?

The Permethrin treated uniform seems to offer superior insect protection over a combination of an untreated uniform and insect repellent. Ninety percent of the soldiers felt that they had fewer bites than usual when wearing the treated uniform. Also, when satisfaction ratings for the treated uniforms were compared with satisfaction ratings for various insect repellents, the treated uniform received significantly higher ratings for effectiveness against crawling insects, flying insects, ticks and chiggers.

Ninety-four percent of the soldiers at the end of the evaluation felt that the treated uniform was safe to wear. While there were some reports of irritation that respondents attributed to the Permethrin treatment, this was only true for about one-fourth of the survey group (29% on the midpoint and 20% final questionnaire). Most of these problems were minor (a sensation or low-level rash) and were transitory (about a week in duration). Laundering the uniform a few times seemed to eliminate the problem for half of those who experienced it, while others reported that it faded over time. Only five soldiers (3.8%) indicated on the final questionnaire that they experienced irritation whenever they put the uniform on.

The treated uniforms probably lost some of their effectiveness over time. Ratings for effectiveness against flying and crawling insects were significantly lower at the end of the evaluation than at the midpoint, but were not significantly different for effectiveness against ticks and chiggers. Overall, 90% of the soldiers felt that they were receiving fewer bites than usual when they wore the treated uniform at the end of the evaluation. It is interesting that wear data and laundering data did not correlate with effectiveness. Based on soldier responses it would seem that any loss of effectiveness may have been merely a function of time rather than time worn or times laundered.

The treatment seemed to still be effective after all three uniforms were worn a total average of 55 days over a six-month period and were laundered an average of 26 times. As noted above, soldier satisfaction ratings with the effectiveness of the treated uniform against flying and crawling insects were significantly lower at the end of the evaluation than they were at the midpoint. However, 90% of the soldiers felt that they were receiving fewer bites than usual when they wore the treated uniform at the end of the evaluation. It was also noted that none of this data correlated with the number of times soldiers reported that they wore or laundered their uniforms.

The Permethrin treatment did not have a significant impact on basic uniform performance. However, the change of OG-107 fabric from 100% cotton (non-standard) to 50/50 nylon and cotton fabric (standard) probably did. Durability was similar, if not better than expected with only 11% of the respondents reporting uniform components damaged to the point that they could no longer be worn. Comfort was not really impacted in a major way. Only about 20% (n=25 out of 131) felt that the treated uniform was less comfortable than an untreated uniform. Most of these (n=14 out of 25) reported that the treated uniform felt hotter. It should be noted that the 50/50 nylon/cotton material is somewhat less breathable than 100% cotton and may feel somewhat hotter. Only 5% (n=7 out of 132) felt that the treated uniform was less comfortable due to a rash or irritation.

No direct data was collected on the impact, either positive or negative, that the Permethrin treatment has on overall soldier performance and effectiveness in the field. However, it would seem that the Permethrin treatment probably did improve soldier performance to some extent. These soldiers felt that wearing the treated uniform led to fewer insect bites, controlled insects on and around them, and offered better protection than an untreated uniform with insect repellent. Furthermore, the treated uniform received significantly higher satisfaction ratings for suitability for field use and overall performance than the untreated uniform/insect repellent combination.

Overall, 87% of the evaluation participants preferred the Permethrin treated uniform to present options for insect protection in the field, which for this group primarily consisted of the use of insect repellent. Furthermore, 87% of the respondents also felt that the Permethrin treated uniform should be offered in the Clothing Sales Store as an optional purchase item. Most of those who disagreed with this option (n=18), were primarily concerned with increased uniform cost (n=13).

The answer seems obvious - the factory treated Permethrin uniform had overwhelming support from these soldiers and they indicated that it should be made available to them through the Clothing Sales Store. It is highly recommended that, along with any other labeling that may go on these uniforms, a statement be added that the uniform be laundered at least once before wearing them to help minimize the potential for minor irritation.

## **Attachment A: User Evaluation Plan for Factory-treated Permethrin Field Uniforms**

### **1. Purpose**

The purpose of this document is to provide and outline for the User Evaluation of the factory-treated Permethrin field uniforms.

### **2. Items Being Evaluated**

Two types of uniforms, the standard Woodland Camouflage Hot Weather Battledress Uniform (HWBDU) and the OG-107 Jungle Fatigues, will be factory impregnated with .125 milligrams of Permethrin per square centimeter. A total of 1,629 uniforms will be treated. Uniform type is not relevant to the basic design of the evaluation. The HWBDU will be used for a pilot evaluation and the OG-107 Jungle Fatigues will be used for the primary evaluation.

### **3. Background**

Permethrin, an FDA approved insect repellent, has been used as a uniform treatment for some time. It has proven to be beneficial in the reduction of insect bites that can reduce the effectiveness of military personnel in the field. However, present techniques require that the user perform the procedures to apply the Permethrin treatment. In addition to being time-consuming, this process also introduces the possibility of human error that could lead to misapplication.

### **4. Goal of the Evaluation**

The goal of the evaluation is to provide data to be used by decision makers as to the suitability of factory treatment of field uniforms with Permethrin. The treated uniform should provide the individual soldier with insect protection equivalent to, or greater than, presently fielded capabilities for a prolonged period with no adverse effects.

### **5. Evaluation Sites and Time Period**

The evaluation will be conducted at the Joint Readiness Training Center (JRTC), Fort Polk, LA during the period May 1999 through March 2000. JRTC Operational Controllers (OCs) will participate in a three-month pilot evaluation and aggressor force personnel from the 509<sup>th</sup> Airborne will make up the primary evaluation group. It is possible that the evaluation will be lengthened by three to six months depending on the longevity of the Permethrin treatment.

### **Key Dates**

April 99: Initiate pilot study with Woodland BDU group,  
Aug 99: End pilot study, issue OG-107s to 1/509 group  
Nov 99: Midpoint data collection for 1/509  
April 00: TBD Nov: Final report available

## **6. Safety**

Permethrin has been approved for use as a uniform treatment for some time. However, the following steps have been taken to ensure the safety of the evaluation participants.

- a. All relevant documentation related to safety will be in order and a safety release will be obtained prior to uniform issue.
- b. Medical personnel at Fort Polk have been briefed on all aspects of the evaluation. They will monitor the participants during sick call for any health problem that could be potentially related to use of clothing treated with Permethrin. They also have the authority to terminate the evaluation for an individual soldier, or for the group as a whole, if at any time they determine a potential health hazard that arises from use of the Permethrin treated uniforms.
- c. The soldiers participating in the evaluation will be thoroughly briefed on all aspects of the evaluation. They will receive information on Permethrin, how the uniforms were treated, and the purpose of the evaluation. They will also receive information on the evaluation requirements, procedures and safeguards. They will also be informed that participation is on a voluntary basis and that they can drop out at any time for any reason.
- d. If a medical or safety concern leads to the termination of the evaluation, SBCCOM personnel will travel to Fort Polk. All of the uniforms will be collected and treated so that the Permethrin is neutralized in accordance with safe handling procedures.

## **7. Evaluation Factors**

- a. Does the treated uniform offer equivalent or superior insect protection over what is currently used by soldiers in the field?
- b. Does the Permethrin treatment have any impact, either positive or negative, on the health or safety of the evaluation participants?
- c. What impact does laundering and exposure to field conditions (i.e. sun, rain, dirt, etc.) have on the effectiveness of the Permethrin treatment?
- d. Does the Permethrin treatment have any impact on basic uniform performance (i.e. comfort, durability, etc.)?
- e. What impact, either positive or negative, does the Permethrin treatment have on overall soldier performance and effectiveness in the field?
- f. Do soldiers prefer the Permethrin treated uniform to present options for insect protection in the field?

## **8. Evaluation Design**

This is a simple user evaluation of the Permethrin treated uniform. No control group will be used since insect protection can be accomplished by soldiers in many different ways. In addition, uniform type is not considered an independent variable since the uniforms are highly similar. However, the data will be analyzed by a number of variables, including uniform type, to determine if any extraneous factors had an impact on the results of the evaluation. Being a simple user evaluation, soldiers will complete questionnaires that address the evaluation factors listed above in section 6. In addition, questionnaire data will also be collected that seeks to compare the user's opinion of the Permethrin BDU with that of current fielded systems. Adjunctive data will include information from medical personnel, laboratory analysis of sample uniforms collected at certain time periods, and interviews or focus groups with evaluation participants.

## **9. Evaluation Requirements**

- a. The evaluation period is expected to be 180 days, with the possibility of extending it an additional 180 days. It should be noted that the length of the evaluation can always be impacted by world political or military conditions (i.e. deployments, changes in training schedules, etc.).
- b. Since the nature of a User Evaluation calls for an active Army unit engaged in a regular training cycle, the evaluation will be conducted on a non-interference basis. Only limited contact will be maintained with the unit during the evaluation period to limit the impact on the participating unit.

## **10. Evaluation Procedures**

- a. All of the uniforms will be inspected for major manufacturing defects prior to issue.
- b. Soldiers will be invited to try on at least one set of the uniforms at the time of issue to ensure proper fit.
- c. Unit leaders will be briefed on the purpose of the evaluation as well as the purpose of the program. Safety issues will also be briefed.
- d. All of the evaluation participants will receive a briefing describing the purpose of the evaluation, medical information on Permethrin, procedure for reporting medical complaints, laundering procedures, and evaluation requirements.
- e. Participation in the evaluation is on a purely voluntary basis. Soldiers will also be explicitly told that they can discontinue use of the uniform at any time if they feel it is even a minor threat to their safety or health.
- f. No soldier will be issued uniforms if they anticipate reassignment before the evaluation is completed.
- g. No soldier would be issued uniforms that do not attend the safety/information briefing. No uniforms will be left behind for issue to participants who could not attend the official briefing and issue.

- h. A roster of unit personnel participating in the evaluation will be maintained. A copy of this roster will be provided to OFIG, the participating unit, and the medical monitoring personnel at Fort Polk.
- i. Telephone/e-mail contact will be required with a unit POC between issue and data collection visits.
- j. At the designated mid-point and end of the evaluation, all available participants will complete questionnaires assessing the performance of the treated uniforms.
- k. Interviews or focus groups will be conducted with representative unit personnel at either the mid-point or end of the evaluation.
- l. Some uniforms will be collected at the end of the evaluation for laboratory testing. It is possible that all of the uniforms will be collected at the end of the evaluation. (TBD)
- m. At any point, the medical representatives at Fort Polk can discontinue the evaluation for an individual, or the entire group, if they feel that participants (individually or collectively) are in any danger from the treated uniforms.

## 11. Key Measures

Data generated to evaluate against the factors outlined in Section 7 (above) will be in three forms:

- a. Medical data related to any side effects of the Permethrin treatment and its effectiveness in preventing serious insect bites/stings during the course of the evaluation. This data should be evaluated by the medical personnel at Fort Polk and an opinion/recommendation forwarded to PM-Enhanced Soldier Systems.
- b. Data from questionnaires completed by the evaluation participants. These forms will seek subjective and objective opinions from participants using a combination of items (e.g. "yes" or "no" questions, multiple choice, ratings scales, etc.).
- c. Some form of interview or focus group data will be obtained from the evaluation participants. The format of these sessions will vary according to the availability of troops. To a large extent, the data will be considered adjunctive to the medical and questionnaire data unless a trend or new issue emerges.
- d. Item inspection and laboratory testing to determine physical characteristics of the uniform and Permethrin treatment.

## **Attachment B: Permethrin-treated Uniform Pilot Evaluation Summary**

### **Survey Group:**

Thirty-eight male Soldiers from the JRTC Operations Group. Most were senior Non-Commissioned Officers (92%, n=35). The average age was 33. All had been issued, and had worn, the Permethrin-treated BDU.

### **Time Worn:**

The treated uniforms were worn for an average of nearly 300 total hours (16 hours a day for 18 days). The participants each received three uniforms. All wore at least one (100%, n=38). Two-thirds (66%, n=25) wore two of three uniforms issued and one-third (34%, n=13) wore all three. None of the respondents reported that they mixed treated and untreated coats and trousers.

### **Fit & Durability:**

All of the respondents felt that the uniforms fit when they were issued (100%, n=37 out of 37). Only one soldier had a fit problem at the time when this data was collected: he felt that the pants were now too tight. No major durability problems were reported with the uniforms.

### **Use of Insect Repellent:**

About one third of the group did not wear insect repellent with the Permethrin-treated BDU (34%, n=13). The remainder (n=25) used insect repellent "sometimes" (26%, n=10), "often" (24%, n=9), or "always" (16%, n=6) when they were wearing the treated uniforms. The most common types used were Deep Woods Off (n=13), Cutter (n=10), and the standard issue repellent (n=9). The repellent was used to treat exposed skin (n=24) and not the BDU material or the skin covered by the uniform.

### **Laundering:**

Soldiers reported laundering the treated uniforms an average of 8 times, or about three times for each of the sets they received. Generally, the uniforms were machine washed by the evaluation participant (82%, n=31). None of the respondents felt that laundering decreased the effectiveness of the Permethrin treatment.

### **Safety:**

Thirteen percent (n=5 out of 38) reported that they had a physical side-effect from wearing the treated uniforms. All five described these as minor problems, with most being rashes (n=4). Specific locations of these rashes were cited as neck (n=2), groin (n=1), and an unspecified location (n=1). One other soldier felt that wearing the uniform gave him a headache (n=1). However, almost all of the respondents (95%, n=36) felt that the treated uniforms were safe to use. Please note that two soldiers did not answer this question.

### **Insect Bites:**

Very few soldiers reported problems with either insect bites (n=33) or ticks and chiggers (n=37). These respondents felt that the Permethrin-treated uniform was either partly (85%, n=28 out of 33) or wholly responsible (n=6%, n=2) for their lack of bites, chiggers, and ticks. Those who did have problems (n=5) reported that they received the bite on exposed skin (n=5) and that they did not have to seek medical treatment for the problem (n=5).



**Effectiveness of the Treated Uniform:**

Almost all of the test participants (95%, n=36) felt that the treated uniform was effective in controlling insects on and around them. In addition, 91% (n=31 out of 34) felt that they had fewer bites, chiggers, and ticks when they were wearing the treated uniform than they normally have in the field.

Soldiers rated how much of a problem certain types of insects are to them when they are in the field. A four-point scale was used (see below). The data from the background survey is compared with that obtained from the mid-point survey. In this case, the first column (BACKGROUND) reflects the results for a standard BDU with insect repellent. The second column is for the Permethrin-treated BDU. Note that ratings for most insect types fell from "Moderate Problem" to "No Problem." Please remember that this is subjective data and based only on the memory and opinions of the evaluation participants.

NO PROBLEM	SLIGHT PROBLEM	MODERATE PROBLEM	SEVERE PROBLEM
1	2	3	4
		BACKGROUND SURVEY (n=75)	MIDPOINT SURVEY (n=38)
Mosquitoes		3.6	1.9
Ticks		2.9	1.1
Stinging insects		2.7	1.1
Biting flies		3.0	1.3
Chiggers		3.2	1.3

In addition to the ratings presented above, ninety percent (n=34) of the respondents felt that the treated uniforms offered better protection than the standard uniform/insect repellent combination.

**Preference:**

In general, the soldiers in this group would prefer to wear the treated uniform (86%, n=32 out of 37) to the standard uniform (14%, n=5 out of 37). In addition, more than three-fourths (81%, n=29 out of 36) felt that the treated uniform should be available in the Clothing Sales Store.

### Attachment C: Permethrin Field Uniform Background Questionnaire

Thank you for your participation in this evaluation. The uniforms you are being issued have been factory treated with a low level of Permethrin. This is a FDA and U.S. Army approved insect repellent. The current method for impregnating uniforms with this substance requires the individual soldier to perform the task himself. This takes time, generates waste, and may lead to an incorrect or inefficient application. As a baseline to compare the results of the factory treatment, we need to collect some background information on the present insect threat as well as what you are using now for insect protection in the field. Please answer all of the questions as completely as you can. If you have any questions, feel free to ask the evaluation team. One final note: participation in this evaluation is completely voluntary. If you have any reservations, please let us know now and we will not include you in the evaluation group.

Rank? E-\_\_\_\_ O-\_\_\_\_ WO-\_\_\_\_

MOS? \_\_\_\_\_

Age? \_\_\_\_ years

How long have you been in the military? \_\_\_\_ years \_\_\_\_ months

How long have you been at this duty station? \_\_\_\_ years \_\_\_\_ months

Answer the following question only if you have been stationed at Fort Polk for less than a year:

\*The evaluation will run from the date of issue through October. Have you been in the field at Fort Polk during these months?

YES NO

1. Has the use of Permethrin ever caused any kind of problem for you (i.e. a rash, itching, etc.)?

YES NO DON'T KNOW

**IF YES, NOTIFY THE EVALUATION TEAM.**

2. Since you have been in the Army have you ever had to seek medical treatment for insect bites?

YES NO

If YES, please explain problem and where and when it happened. Also let us know if you missed any duty time and if so, how much.

3. What are you primarily using at Fort Polk for insect repellent in the field now? Circle ONE answer.

- a. Nothing (if you circle this, skip to question 5)
- b. Insect repellent issued by my unit (specify type: \_\_\_\_\_)
- c. Commercial insect repellent I buy myself (specify type: \_\_\_\_\_)
- d. Current Permethrin uniform treatment
- e. Other (specify: \_\_\_\_\_)

4. Answer the following questions based on the type of insect repellent you circled in question 3.

- a. How long is one application effective for? \_\_\_\_\_ hours
- b. Does this repellent cause any physical problems for you (i.e. rash, irritation, etc.) YES NO  
If YES, please explain.

c. Overall, do you feel it is safe to use? YES NO

d. Please rate how satisfied or dissatisfied you are with the following aspects of your present insect repellent. Circle one number for each.

	VERY DISSATISFIED 1	MODERATELY DISSATISFIED 2	SOMEWHAT DISSATISFIED 3	NEITHER DISSATISFIED NOR SATISFIED 4	SOMEWHAT SATISFIED 5	MODERATELY SATISFIED 6	VERY SATISFIED 7
a. Length of protection				1 2	3 4	5 6	7
b. Ease of application				1 2	3 4	5 6	7
c. Odor produced				1 2	3 4	5 6	7
d. Effectiveness against crawling insects				1 2	3 4	5 6	7
e. Effectiveness against flying insects				1 2	3 4	5 6	7
f. Physical side-effects (i.e. rash, irritation, etc.)				1 2	3 4	5 6	7
g. Suitability for field use				1 2	3 4	5 6	7
h. Overall performance				1 2	3 4	5 6	7

e. Any other comments?

5. Have you ever used a Permethrin treatment on your BDUs or field uniforms?

YES

NO

IF YES, where and when?

a. How long was one application effective for? \_\_\_\_\_ months

b. Did this treatment cause any physical problems for you (i.e. rash, irritation, etc.) YES NO

If YES, please explain.

c. Overall, did you feel it is safe to use? YES NO

d. Please rate how satisfied or dissatisfied you are with the following aspects of the Permethrin treatment. Circle one number for each.

VERY DISSATISFIED	MODERATELY DISSATISFIED	SOMEWHAT DISSATISFIED	NEITHER DISSATISFIED NOR SATISFIED	SOMEWHAT SATISFIED	MODERATELY SATISFIED	VERY SATISFIED
1	2	3	4	5	6	7
a. Length of protection			1 2	3 4	5 6	7
b. Ease of application			1 2	3 4	5 6	7
c. Odor produced			1 2	3 4	5 6	7
d. Effectiveness against crawling insects			1 2	3 4	5 6	7
e. Effectiveness against flying insects			1 2	3 4	5 6	7
f. Physical side-effects (i.e. rash, irritation, etc.)			1 2	3 4	5 6	7
g. Suitability for field use			1 2	3 4	5 6	7
h. Overall performance			1 2	3 4	5 6	7

e. Any other comments?

6. During the period of May through October, how much of a problem are the following types of insects at Fort Polk? Circle one number for each. If you have never been in the field at Fort Polk during this time period, check here: \_\_\_\_ and go to question 10.

	NO PROBLEM 1	SLIGHT PROBLEM 2	MODERATE PROBLEM 3	SEVERE PROBLEM 4
a. Mosquitoes			1 2	3 4
b. Ticks			1 2	3 4
c. Stinging insects (bees, wasps, etc.)			1 2	3 4
d. Biting flies			1 2	3 4
e. Chiggers			1 2	3 4
f. Fire ants			1 2	3 4
g. Other (list below if moderate to severe problem)				

7. Overall, how would you rate the insect threat to the health and safety of soldiers at Fort Polk? Circle one number.

NO THREAT AT ALL 1	MINOR THREAT 2	MODERATE THREAT 3	MAJOR THREAT 4
--------------------------	----------------------	-------------------------	----------------------

Please comment if you feel necessary.

8. Do you have any other comments? List them below.

**Attachment D: Permethrin-treated uniform Evaluation Background Questionnaire Summary  
(n=356)**

**Demographics (n=356)**

<b>Rank:</b>	E-1 to E-3	27%, n=94
	E-4 to E-5	47%, n=166
	E-6 to E-9	18%, n=64
	Officers	8%, n=29

<b>MOS:</b>	Infantry (75%, n=268)
	Cavalry Scout (16%, n=57)
	Medical (4%, n=16)

**Average age:** 25

**Average time in the Army:** 5 years

<b>Average time at Fort Polk:</b>	Less than 6 months: 18%, n=63
	6 months to 1 year: 21%, n=74
	1 to 2 years: 44%, n=158
	More than two years: 17%, n=60

<b>Sensitivity to Permethrin:</b>	Only three soldiers reported that they believe they are sensitive to Permethrin. These soldiers spoke with the medical representative. Their problems were minor (rashes)
-----------------------------------	---

**Present Insect Protection (n=312)**

13% (n=40) reported that they do not regularly use insect repellent in the field.

Some (19%, n=60) use the standard issue repellent.

Most (68%, n=212) use some type of commercial item. The most popular were...

Deep Woods Off	47%, n=146
Cutter	6%, n=20
Off	6%, n=18
Repel	4%, n=13
Other (misc. commercial)	3%, n=8
Skin So Soft (Avon)	2%, n=7

\* Note: 44 soldiers either did not answer this question or answered it incorrectly.

**Insect repellent (n=272):**

Mean ratings for commercial insect repellent (n=272):

VERY DISSATISFIED	MODERATELY DISSATISFIED	SOMEWHAT DISSATISFIED	NEITHER DISSATISFIED NOR SATISFIED	SOMEWHAT SATISFIED	MODERATELY SATISFIED	VERY SATISFIED
1	2	3	4	5	6	7
				4.2		
				3.9		
				4.6		
				4.2		
				5.7		
				5.1		
				4.8		

All ratings are neutral to positive, with the lowest being length of protection (which averaged 3.5 hours) and the highest being for ease of application.

How much of a problem were each of the following types of insects? Circle one number for each.

NO PROBLEM	SLIGHT PROBLEM	MODERATE PROBLEM	SEVERE PROBLEM
1	2	3	4
		2.34	n=322
		1.74	n=318
		1.68	n=315
		2.08	n=317
		2.23	n=306
		2.23	n=315

**Experience with Present Permethrin BDU Treatment (n=30)**

Less than one-fourth of the group reported that they have experience with the existing Permethrin BDU treatment (19%, n=66). The majority of these soldiers felt that the treatment was safe to use (n=52).

### Attachment E: Permethrin-treated Field Uniform Midpoint Questionnaire

Thank you for your participation in this evaluation. Please answer all of the questions as completely as you can. If you have any questions, feel free to ask the evaluation team. We would like to remind you that participation in this evaluation is completely voluntary. If you have any reservations, you may stop participating at any time. However, you will still need to complete this questionnaire.

Rank? E-\_\_\_\_ O-\_\_\_\_ WO-\_\_\_\_

MOS, Branch, or Specialty? \_\_\_\_\_

Unit: \_\_\_\_\_

Age? \_\_\_\_ years

Were you issued the permethrin-treated uniforms?      YES      NO

**IF NO, HAND IN THIS QUESTIONNAIRE NOW.**

1. How many total days did you wear a permethrin-treated uniform in the field or in garrison?

\_\_\_\_\_ days

How many hours per day did you usually wear the uniform?      \_\_\_\_ hours per day

2. Approximately how many days did you wear each permethrin-treated uniform? If you received a set but did not wear it, enter a "0."

a. Set 1: \_\_\_\_\_ days

b. Set 2: \_\_\_\_\_ days

c. Set 3: \_\_\_\_\_ days

3. Did the uniforms fit when they were issued to you?      YES      NO  
Do the uniforms you were issued fit now?      YES      NO

If you answered NO to either, please explain (i.e. they were too tight, too loose, etc.). Also tell us if the fit problems were with the shirt, pants, or both.



4. What type of training or missions did you wear the permethrin-treated uniform for?

5. Did you have any major durability problems (i.e. tears, holes, etc.) with any of the uniforms that you were issued?

YES NO

If YES, did you have to stop wearing any of the uniforms or components (i.e. shirt or pants)?

YES NO

If YES, please list the items that you can not wear anymore and what happened to them (i.e. "one pair of pants – torn on concertina wire").

6. Did you ever wear a permethrin-treated shirt or pants with an untreated shirt or pants?

YES NO

If YES, how often did you do this? Circle one answer.

ALMOST NEVER	SOMETIMES	OFTEN	ALWAYS
1	2	3	4

Why did you mix and match treated and untreated uniforms?

7. How often did you wear insect repellent with the permethrin-treated uniforms when you were in the field? Circle one answer.

NEVER	SOMETIMES	OFTEN	ALWAYS
1	2	3	4

**IF YOU ANSWERED "NEVER," SKIP TO QUESTION 8.**

What type of insect repellent did you use? Circle all that apply.

- a. Spray
- b. Lotion/cream
- c. Stick
- d. Liquid

What brand did you use? Circle all that apply.

- a. Deep Woods Off
- b. Off (including "Skintastic")
- c. Cutter
- d. Repel
- e. U.S. Army (green tube)
- f. Other (Specify: \_\_\_\_\_)

How did you usually use the insect repellent? Circle all that apply.

- a. On your exposed skin
- b. On your skin under your clothing
- c. On the permethrin-treated material
- d. Other (Specify: \_\_\_\_\_)

8. Did anything that you used (i.e. insect repellent, camo face paint, etc.) or came in contact with (i.e. gasoline, weapons cleaning oil, etc.) seem to have any impact on the permethrin treatment?

YES NO

If YES, please explain.

9. How many times did you launder each set of permethrin-treated uniforms you were issued? If you received a set but did not launder it, enter a "0."

- a. Set 1: \_\_\_\_\_ times
- b. Set 2: \_\_\_\_\_ times
- c. Set 3: \_\_\_\_\_ times

**SKIP TO QUESTION 12 IF YOU DID NOT LAUNDER ANY OF THE UNIFORMS.**

10. How did you usually launder the uniforms?

- a. Machine washed them myself
- b. Took them to a base laundry
- c. Other (specify: \_\_\_\_\_)

11. Did laundering seem to make the permethrin treatment less effective against bugs?      YES      NO

If YES, after how many launderings?      \_\_\_\_\_ launderings

Did the effectiveness drop off just once or did it continue to drop off throughout the evaluation?  
Circle one answer.

- a. Dropped off just once and then seemed to stay the same
- b. Continued to drop off after each laundering

Do you have any other comments?

12. When you were wearing the permethrin-treated uniform did you have a problem with...

- |                        |     |    |
|------------------------|-----|----|
| a. ticks and chiggers? | YES | NO |
| b. insect bites?       | YES | NO |

If NO, do you think you were not bitten because you were wearing the permethrin treatment? Circle one answer.

- a. NO, the uniform had nothing to do with preventing bites and ticks
- b. YES, the uniform was part of the reason
- c. YES, the uniform was the only reason

Explain your answer.

If YES, where were the bites/ticks located?	a. Exposed skin?	YES	NO
	b. Under an area covered by the uniform	YES	NO

what type of bites were they (i.e. mosquito, spider, etc.)?

did you have to seek treatment for these bites?      YES      NO

If YES, explain (include the number of days you missed duty).

13. What impact did the permethrin-treated uniform seem to have on the number of insect bites or ticks that you had in the field? Circle one answer.

- a. I had fewer bites/ticks than usual when wearing the permethrin BDU
- b. I had the same number of bites/ticks that I usually have
- c. I had more bites/ticks when wearing the permethrin BDU than usual

Please explain your answer.

14. When you were wearing the uniform how much of a problem were each of the following types of insects? Circle one number for each.

	NO PROBLEM 1	SLIGHT PROBLEM 2	MODERATE PROBLEM 3	SEVERE PROBLEM 4
a. Mosquitoes			1 2	3 4
b. Ticks			1 2	3 4
c. Stinging insects (bees, wasps, etc.)			1 2	3 4
d. Biting flies			1 2	3 4
e. Chiggers			1 2	3 4
f. Insects overall			1 2	3 4
g. Other (list below if moderate to severe problem).				

15. Overall, do you feel that the permethrin treatment was effective in controlling insects on and around you?

YES NO

Please explain your answer.

- YES NO

YES NO

YES NO

32

20. Please rate how satisfied or dissatisfied you are with the following aspects of the permethrin-treated uniform. Circle one number for each.

VERY DISSATISFIED	MODERATELY DISSATISFIED	SOMEWHAT DISSATISFIED	NEITHER DISSATISFIED NOR SATISFIED	SOMEWHAT SATISFIED	MODERATELY SATISFIED	VERY SATISFIED
1	2	3	4	5	6	7
a. Length of protection			1 2	3 4	5	6 7
b. Effectiveness against crawling insects			1 2	3 4	5	6 7
c. Effectiveness against flying insects			1 2	3 4	5	6 7
d. Effectiveness against ticks & chiggers			1 2	3 4	5	6 7
e. Lack of physical side-effects (i.e. rash, irritation, etc.)			1 2	3 4	5	6 7
f. Suitability for field use			1 2	3 4	5	6 7
g. Overall performance			1 2	3 4	5	6 7

21. Overall, which would you prefer to wear in the field? Circle one answer.

- a. The permethrin-treated uniform with no insect repellent
- b. The permethrin-treated uniform with insect repellent
- c. An untreated uniform with insect repellent
- d. An untreated uniform with no insect repellent

Explain your answer.

22. Would you like to see the permethrin-treated uniform available in the Clothing Sales Store as an optional purchase item?

YES NO

Please explain your answer.

23. List any other comments here.



## Attachment F: Permethrin Field Uniform Final Questionnaire

Thank you for your participation in this evaluation. Please answer all of the questions as completely as you can. If you have any questions, feel free to ask the evaluation team. We would like to remind you that participation in this evaluation is completely voluntary. If you have any reservations, you may stop participating at any time. However, you will still need to complete this questionnaire.

Rank? E-\_\_\_\_ O-\_\_\_\_ WO-\_\_\_\_

MOS, Branch, or Specialty? \_\_\_\_\_

Unit: \_\_\_\_\_

Age? \_\_\_\_ years

Were you issued the permethrin-treated uniforms?      YES      NO

Are you still wearing them?      YES      NO

If NO, why not?

### IF YOU ANSWERED NO TO BOTH, HAND IN THIS QUESTIONNAIRE NOW.

1. How many total days did you wear a permethrin-treated uniform since August? \_\_\_\_ days

How many hours per day did you usually wear the uniform? \_\_\_\_ hours per day

2. Approximately how many days did you wear each permethrin-treated uniform? If you received a set but did not wear it, enter a "0."

a. Set 1: \_\_\_\_ days

b. Set 2: \_\_\_\_ days

c. Set 3: \_\_\_\_ days

3. Do all of the uniforms you were issued fit?      YES      NO

4. Have you had to stop wearing any of the uniforms or components (i.e. shirt or pants) because of damage or wear and tear?

YES      NO





8. Did anything that you used (i.e. insect repellent, camo face paint, etc.) or came in contact with (i.e. gasoline, weapons cleaning oil, etc.) seem to have any impact on the permethrin treatment?

YES

NO

If YES, please explain.

9. How many times have you laundered each set of permethrin-treated uniforms you were issued? If you received a set but did not launder it, enter a "0."

Set 1: \_\_\_\_\_ times

Set 2: \_\_\_\_\_ times

Set 3: \_\_\_\_\_ times

**SKIP TO QUESTION 12 IF YOU DID NOT LAUNDER ANY OF THE UNIFORMS.**

10. How did you usually launder the uniforms?
- a. Machine washed them myself
  - b. Took them to a base laundry
  - c. Other (specify: \_\_\_\_\_)

11. Did laundering seem to make the permethrin treatment less effective against bugs? YES NO

If YES, after how many launderings? \_\_\_\_\_ launderings

Did the effectiveness drop off just once or did it continue to drop off throughout the evaluation?  
Circle one answer.

- a. Dropped off just once and then seemed to stay the same
- b. Continued to drop off after each laundering

12. When you were wearing the permethrin-treated uniform did you have a problem with...

- |                        |     |    |
|------------------------|-----|----|
| a. ticks and chiggers? | YES | NO |
| b. insect bites?       | YES | NO |

If NO, do you think the permethrin treatment protected you. Circle one answer.

- a. NO, the uniform had nothing to do with preventing bites and ticks
- b. YES, the uniform was part of the reason
- c. YES, the uniform was the only reason

- If YES, where were the bites/ticks located?
- |                       |     |    |
|-----------------------|-----|----|
| a. Exposed skin?      | YES | NO |
| b. Under the uniform? | YES | NO |

what type of bites were they (i.e. mosquito, spider, etc.)?

did you have to seek treatment for these bites?      YES      NO

If YES, explain (include the number of days you missed duty).

13. What impact did the permethrin-treated uniform seem to have on the number of insect bites or ticks that you had in the field? Circle one answer.

- a. I had fewer bites/ticks than usual when wearing the permethrin BDU
- b. I had the same number of bites/ticks that I usually have
- c. I had more bites/ticks when wearing the permethrin BDU than usual

14. When you were wearing the uniform how much of a problem were each of the following types of insects? Circle one number for each.

	NO PROBLEM 1	SLIGHT PROBLEM 2	MODERATE PROBLEM 3	SEVERE PROBLEM 4
a. Mosquitoes			1    2	3    4
b. Ticks			1    2	3    4
c. Stinging insects (bees, wasps, etc.)			1    2	3    4
d. Biting flies			1    2	3    4
e. Chiggers			1    2	3    4
f. Insects overall			1    2	3    4

15. Overall, do you feel that the permethrin treatment controlled insects on and around you?

YES      NO

16. Overall, do you feel that the permethrin-treated uniform offers better protection than the combination of an untreated uniform BDU and insect repellent?

YES      NO

Please explain your answer.

17. Do you feel that wearing the permethrin-treated uniform ever caused any physical problems for you (i.e. rashes, irritation, etc.) that you would not normally have?

YES

NO

If NO, skip to question 18.

If YES, answer the following questions.

What type of problem did you have? Circle all that apply.

- a. Minor irritation (no redness but slight burning sensation, "tingling," etc.)
- b. A rash (redness, itching, burning sensation, etc.)
- c. Major skin problems (redness, itching, oozing, etc.)
- d. The uniform aggravated another problem I had (specify: \_\_\_\_\_)
- e. Other (specify: \_\_\_\_\_)

How much of your body was affected? Circle one answer.

- a. Specific areas (where: \_\_\_\_\_)
- b. All over (wherever the uniform touched)
- c. Other (specify: \_\_\_\_\_)

When did you have the problem and how long did the problem last? Circle one answer.

- a. At the beginning of the evaluation: \_\_\_\_\_ days
- b. During the evaluation. Specify month: \_\_\_\_\_, how many days? \_\_\_\_\_ days
- c. Whenever I wore the uniforms

Did you have to seek medical attention for this problem?

YES

NO

If YES, explain.

Did laundering the uniforms eliminate the rash or skin problems?

YES

NO

If YES, how many launderings? \_\_\_\_\_ launderings

18. Overall, do you feel that the permethrin treatment has any impact on the comfort of the uniform?

YES

NO

If YES, circle one answer.

- a. The permethrin-treated uniform is more comfortable to wear.
- b. The permethrin-treated uniform is less comfortable to wear.

19. Overall, do you feel that the permethrin-treated BDU is safe to use?      YES      NO

If NO, explain

20. Please rate how satisfied or dissatisfied you are with the following aspects of the permethrin-treated uniform. Circle one number for each.

VERY DISSATISFIED	MODERATELY DISSATISFIED	SOMEWHAT DISSATISFIED	NEITHER DISSATISFIED NOR SATISFIED	SOMEWHAT SATISFIED	MODERATELY SATISFIED	VERY SATISFIED
1	2	3	4	5	6	7
a. Length of protection			1    2	3    4	5    6	7
b. Effectiveness against crawling insects			1    2	3    4	5    6	7
c. Effectiveness against flying insects			1    2	3    4	5    6	7
d. Effectiveness against ticks & chiggers			1    2	3    4	5    6	7
e. Lack of physical side-effects (i.e. rash, irritation, etc.)			1    2	3    4	5    6	7
f. Suitability for field use			1    2	3    4	5    6	7
g. Overall performance			1    2	3    4	5    6	7

21. Overall, which would you prefer to wear in the field? Circle one answer.

- a. The permethrin-treated uniform with no insect repellent
- b. The permethrin-treated uniform with insect repellent
- c. An untreated uniform with insect repellent
- d. An untreated uniform with no insect repellent

Explain your answer.

22. Would you like to see a permethrin-treated Hot Weather BDU available in the Clothing Sales Store as an optional purchase item?

YES      NO

Please explain your answer.

**Attachment G: Permethrin-treated Uniform Midpoint Questionnaire Summary  
(n=141)**

**Demographics (n=141)**

Rank:	E-1 to E-3	26%, n=37
	E-4 to E-5	54%, n=76
	E-6 to E-9	13%, n=18
	Officers	7%, n=10
MOS:	Infantry	77%, n=109
	Cavalry Scout	17%, n=24
	Other	6% n=8
Average age:	25	
Average total days of wear for all three Permethrin-treated uniforms:	21 hours per day x 23 days	
Wear Estimates by uniform set:	Set 1:	12 days
	Set 2:	6 days
	Set 3:	3 days

**Wear Characteristics (n=141)**

Did the uniforms fit when issued?	92%, n=130	
Did any of the uniforms become unserviceable due to damage?	9%, n=12	
Did you ever wear a treated shirt or pants with an untreated shirt or pants?	16%, n=22	
If YES, how often did you do this?	NEVER:	14% (n=3/21)
	SOMETIMES:	57% (n=12/21)
	OFTEN:	5% (n=1/21)
	ALWAYS:	24% (n=5/21)
Did anything (i.e. insect repellent, camo face paint, gasoline, etc.) seem to have an impact on the permethrin treatment?	1%, n=1/141	

### Use of Insect Repellent (n=141)

How often did you wear insect repellent with the treated uniforms when you were in the field?

NEVER	50% (n=71)
SOMETIMES	27% (n=38)
OFTEN	13% (n=18)
ALWAYS	10% (n=14)

Type used (n=70):

Deep Woods Off:	74% (n=52/70)
U.S. Army:	26% (n=18/70)
Repel:	16% (n=11/70)
Cutter:	16% (n=11/70)

Form used (n=70):

Spray:	93% (n=64/70)
Lotion/liquid:	22% (n=15/70)

How did you usually use the insect repellent?

On your exposed skin (n=68/70)	99%
On your skin under your clothing (n=5/70)	7%
On the permethrin-treated material (n=4/70)	6%

### Laundering Characteristics (n=137)

Note: Five soldiers reported that they never laundered uniform.

Average number of launderings per set:

Set A: 4 times  
Set B: 2 times  
Set 3: 1 time

How did you usually launder the uniforms?

Machine washed them myself:	97% (n=131)
Took them to a base laundry:	2% (n=3)
Other:	1% (n=1)

Did laundering seem to make the treatment less effective against bugs?

93% (n=127/135) said that it did NOT

If YES (n=9), after how many launderings? 3 launderings

Did the effectiveness...

Dropped off once and then stayed the same (n=6)  
Continued to drop off after each laundering (n=2)

### Insect Protection (n=141)

When you were wearing the treated uniform  
did you have a problem with...

ticks and chiggers: YES: 7%, n=10  
NO: 93%, n=130

insect bites: YES: 21%, n=29  
NO: 79%, n=111

If YES, where were the bites/ticks located? On exposed skin (n=33)  
Under an area covered by the uniform (n=10)

What type of bites were they? Mosquito (n=27)  
Chigger (n=7)  
Spider (n=7)  
Ants (n=4)  
Ticks (n=1)

Did you seek treatment for the bites? YES: 0 out of 39

What impact did the treated uniform seem  
to have on the number of insect bites that  
you had in the field?

Fewer bites than usual: 93%, n=122/131  
I had the same number: 7%, n=9/131  
More bites than usual: -

\* Note: 10 soldiers did not answer this question.

Overall, do you feel that the treatment  
controlled insects on and around you?

YES: 96% (n=129/135)  
NO: 4% (n=6/135)

\* Note: 6 soldiers did not answer this question.

Overall, do you feel that the treated uniform  
offers better protection than the combination  
of an untreated uniform and insect repellent?

YES: 93% (n=124/133)  
NO 7% (n=9/133)

\* Note: 8 soldiers did not answer this question.



14. When you were wearing the uniform how much of a problem were each of the following types of insects? Circle one number for each.

NO PROBLEM 1	SLIGHT PROBLEM 2	MODERATE PROBLEM 3	SEVERE PROBLEM 4
Mosquitoes		1.73	n=134
Ticks		1.10	n=134
Stinging insects (bees, wasps, etc.)		1.12	n=134
Biting flies		1.24	n=134
Chiggers		1.22	n=134
Insects overall		1.46	n=132

#### **Safety (n=141)**

Do you feel that wearing the treated uniform caused physical problems that you would not normally have?

YES: 29% (n=39/135)

NO: 71% (n=96/135)

\* Note: 6 soldiers left this question blank.

If YES, were these...

Minor problems: 97% (n=37/38)

Major problems: 3% (n=1/38)

#### **SEE LAST PAGE FOR SPECIFIC DESCRIPTION OF PROBLEMS**

Overall, do you feel the treatment has an impact on the comfort of the uniform?

YES: 26% (n=35/136)

NO: 74% (n=101/136)

\* Note: 5 soldiers left this question blank.

If YES, is the uniform...

More comfortable to wear? 29% (n=10/35)

Less comfortable to wear? 71% (n=25/35)

Overall, do you feel that the treated uniform is safe to use?

YES: 92% (n=118/129)

NO: 8% (n=11/129)

\* Note: 12 soldiers left this question blank.

### Preference (n=141)

Overall, which would you prefer to wear in the field?

The permethrin-treated uniform with no insect repellent	39% (n=52/133)
The permethrin-treated uniform with insect repellent	50% (n=67/133)
An untreated uniform with insect repellent	8% (n=10/133)
An untreated uniform with no insect repellent	3% (n=4/133)

\* Note: 8 soldiers left this question blank.

Would you like to see the treated uniform available in the Clothing Sales Store as an optional purchase item?

YES: 80% (n=104/130)  
NO: 20% (n=26/130)

Note: 11 soldiers left this question blank.

20. Please rate how satisfied or dissatisfied you are with the following aspects of the permethrin-treated uniform. Circle one number for each.

VERY DISSATISFIED	MODERATELY DISSATISFIED	SOMEWHAT DISSATISFIED	NEITHER DISSATISFIED NOR SATISFIED	SOMEWHAT SATISFIED	MODERATELY SATISFIED	VERY SATISFIED
1	2	3	4	5	6	7
				5.8	134	
				5.8	134	
				5.8	134	
				5.9	133	
				5.3	132	
				6.0	131	
				5.9	134	

Specific problems identified by soldiers on their surveys.

1. SLIGHT RASH, MILD IRRITATION - DID NOT HINDER WORK PERFORMANCE
2. UNIFORM DID NOT BREATHE - FELT HOTTER
3. SKIN IRRITATION, RASH, SLIGHT BURNING SENSATION FOR 1 WEEK
4. A LITTLE RASH AT TIGHT PLACES
5. MINOR BURNING AND REDNESS ON LEGS - BUT ONLY IN HOT WEATHER
6. MINOR "BURN" AROUND BELT LINE, BUT WENT AWAY
7. MADE ME HOTTER IN THE FIELD
8. SLIGHT RASH/BURNING SENSATION FOR 2 DAYS UPON 1ST USE
9. RASH ON LEFT SHOULDER & ARM - HAVE GONE TO SICK CALL
10. MINOR BURNING OF SKIN - SHOULD HAVE WASHED UNIFORM BEFORE WEARING
11. RASH UNDER ARMS, WAIST LINE
12. NOT SURE - DID HAVE A TOTAL BODY RASH THAT I NEVER HAD BEFORE
13. HEAT RASH
14. MINOR RASH ON BACK
15. ITCHINESS ON BACK, NECK - NO LOST DUTY
16. SLIGHT BURNING SENSATION ALL OVER BODY
17. MINOR RASH ON ARMS AND THIGHS
18. RASH ON LEGS LOOKED LIKE CHEM BURN - DID NOT WASH UNIFORM BEFORE WEAR
19. BURNING WHEN YOU SWEAT - LIKE BEN GAY
20. RASH
21. SOME TINGLING THE FIRST DAY I WORE THEM, NOTHING AFTER THAT
22. RASH, ITCH
23. IRRITATION
24. RASH ON BODY WHEN TEMP WAS HOT, NO DAYS LOST
25. ITCHY, BURNING SENSATION ON SKIN, NO LOST DUTY
26. RASH ON ARMS
27. RASH AT ELBOWS, GROIN, WRIST, KNEES
28. ITCHING, MILD IRRITATION AROUND NECK, SHOULDERS
29. BURNING SENSATION ON SKIN
30. POSSIBLE RASH (BACK AND LEGS)
31. BURNING SENSATION ON ARMS BEFORE WASHING
32. RASH ON ARMS - MINOR BURNING AND ITCHING
33. SKIN TINGLED WHEN I SWEAT
34. HOTTER
35. RASH INSIDE LEGS
36. RASH IN GROIN
37. RASH ON ARMS, LEG, CHEST - NO LOST DUTY
38. SLIGHT BURNING

**Attachment H: Permethrin-treated Uniform Final Questionnaire Summary  
(n=132)**

**Demographics (n=132)**

Rank:	E-1 to E-3	21%, n=28
	E-4 to E-5	59%, n=78
	E-6 to E-9	17%, n=22
	Officers	3%, n=4
MOS:	Infantry	88%, n=119
	Cavalry Scout	7%, n=9
	Other	3% n=4
Average age:	25	
Average total days of wear for all three Permethrin-treated uniforms:	20 hours per day x 55 days	
Wear Estimates by uniform set:	Set 1: 23 days	
	Set 2: 16 days	
	Set 3: 13 days	
Wear on the January rotation:	68%, n=90	
Wear on the February rotation:	73%, n=96	

**Wear Characteristics (n=132)**

Did the uniforms fit when issued?	96%, n=126	
Did any of the uniforms become unserviceable due to damage?	11%, n=15	
Did you ever wear a treated shirt or pants with an untreated shirt or pants?	26%, n=34	
If YES, how often did you do this?	ALMOST NEVER:	29% (n=10/34)
	SOMETIMES:	35% (n=12/34)
	OFTEN:	27% (n=9/34)
	ALWAYS:	9% (n=3/34)

### Use of Insect Repellent (n=132)

How often did you wear insect repellent with the treated uniforms when you were in the field?

NEVER	49% (n=64)
SOMETIMES	34% (n=45)
OFTEN	12% (n=16)
ALWAYS	5% (n=7)

Type used (n=68):

Deep Woods Off:	71% (n=48/68)
Cutter:	18% (n=12/68)
Repel:	7% (n=5/68)
U.S. Army:	27% (n=18/68)

Form used (n=68):

Spray:	84% (n=57/68)
Lotion/liquid:	28% (n=19/68)

How did you usually use the insect repellent?

On your exposed skin (n=66/68)	97%
On your skin under your clothing (n=3/68)	4%
On the permethrin-treated material (n=6/68)	9%

### Laundering Characteristics (n=122)

Note: Ten soldiers reported that they never laundered their uniforms.

Average number of launderings per set:

Set A: 10 times
Set B: 9 times
Set 3: 7 time

How did you usually launder the uniforms?

Machine washed them myself:	96% (n=118)
Took them to a base laundry:	2% (n=2)
Other:	2% (n=2)

Did laundering seem to make the treatment less effective against bugs?

YES:	12% (n=14/122)
NO:	86% (n=105/135)

If YES (n=14), after how many launderings? 4 launderings

Did the effectiveness...

Drop off just once and then stayed the same (n=6)
Continued to drop off after each laundering (n=8)

## Insect Protection (n=132)

When you were wearing the treated uniform  
did you have a problem with...

ticks and chiggers: YES: 7%, n=9  
NO: 93%, n=123

insect bites: YES: 27%, n=35  
NO: 73%, n=97

If YES, where were the bites/ticks located? On exposed skin (n=69)  
Under an area covered by the uniform (n=18)

What type of bites were they? Mosquito (n=62)  
Chigger (n=5)  
Spider (n=4)  
Ants (n=4)  
Ticks (n=2)

Did you seek treatment for the bites? YES: 0 out of 81

What impact did the treated uniform seem  
to have on the number of insect bites that  
you had in the field?

Fewer bites than usual: 90%, n=115/127  
I had the same number: 9%, n=12/127  
More bites than usual: 1%, n=1

Overall, do you feel that the treatment  
controlled insects on and around you?

YES: 91% (n=118/129)  
NO: 9% (n=11/129)

Overall, do you feel that the treated uniform  
offers better protection than the combination  
of an untreated uniform and insect repellent?

YES: 91% (n=118/129)  
NO 9% (n=11/129)

When you were wearing the uniform how much of a problem were each of the following types of  
insects? Circle one number for each.

NO PROBLEM 1	SLIGHT PROBLEM 2	MODERATE PROBLEM 3	SEVERE PROBLEM 4
--------------------	------------------------	--------------------------	------------------------

Mosquitoes	1.99	n=130
------------	------	-------

Ticks	1.12	n=130
-------	------	-------

Stinging insects (bees, wasps, etc.)	1.12	n=130
--------------------------------------	------	-------

Biting flies	1.29	n=130
--------------	------	-------

Chiggers	1.22	n=129
----------	------	-------

Insects overall	1.63	n=127
-----------------	------	-------

### Safety (n=132)

Do you feel that wearing the treated uniform caused physical problems that you would not normally have?

YES: 20% (n=26/132)

NO: 80% (n=106/132)

What type of problem did you have? Circle all that apply.

- n=13 Minor irritation (no redness but slight burning sensation, "tingling," etc.)
- n=15 A rash (redness, itching, burning sensation, etc.)
- n=2 Major skin problems (redness, itching, oozing, etc.)
- n=0 The uniform aggravated another problem I had

How much of your body was affected? Circle one answer.

- Specific areas n=21
- All over (wherever the uniform touched) n=5

arms (n=8), crotch (n=7), legs (n=4), underarms (n=2), waist/belt line (n=2), neck (n=1), chest (n=1), back (n=1).

When did you have the problem and how long did the problem last? Circle one answer.

- n=12 At the beginning of the evaluation (X=4 days)
- n=7 During the evaluation. (X=8 days)
- n=5 Whenever I wore the uniforms

Did you have to seek medical attention for this problem?

YES: n=4

NO: n=22

Given anti-bacterial cream (did not really work) n=2

Did laundering the uniforms eliminate the rash or skin problems?

YES: 50%, n=13

NO: 42%, n=11

If YES, how many launderings? X=3 launderings (min=1, max=8)

Overall, do you feel the treatment has an impact on uniform comfort?

YES: 24% (n=31/131)

NO: 76% (n=99/131)

If YES, is the uniform...

More comfortable to wear? 45% (n=14/31)

Less comfortable to wear? 55% (n=17/31)

Overall, do you feel that the treated uniform is safe to use?

YES: 94% (n=120/127)

NO: 6% (n=7/127)

**Preference (n=132)**

Overall, which would you prefer to wear in the field?

The permethrin-treated uniform with no insect repellent	38% (n=49/128)
The permethrin-treated uniform with insect repellent	49% (n=63/128)
An untreated uniform with insect repellent	8% (n=10/128)
An untreated uniform with no insect repellent	5% (n=6/128)

Would you like to see the treated uniform

available in the CSS as for optional purchase	YES: 87% (n=111/127)
	NO: 13% (n=16/127)

20. Please rate how satisfied or dissatisfied you are with the following aspects of the permethrin-treated uniform. Circle one number for each.

VERY DISSATISFIED 1	MODERATELY DISSATISFIED 2	SOMEWHAT DISSATISFIED 3	NEITHER DISSATISFIED NOR SATISFIED 4	SOMEWHAT SATISFIED 5	MODERATELY SATISFIED 6	VERY SATISFIED 7
				5.5	126	
				5.4	125	
				5.2	126	
				5.6	125	
				5.5	127	
				5.8	126	
				5.8	126	